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The nature of Titchener's sensationalism, it is hoped, is clear. It is a sensationalism very different from that of the old school. The sheet of wax cannot act as a true picture for a living substance with "all manner of complex synergy." Titchener may be constitutionally inclined toward sensationalism. He is, however, still more strongly set toward experimentation and although he believes that there are only three elements, all sensational in nature, yet he would be the first to honor the results of a flawless experiment which proved this wrong.

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### THE NEW LOGIC AND THE NEW MATHEMATICS.

IN COMMENT ON MR. PHILIP E. B. JOURDAIN'S ARTICLES.

The new logic is a "science of many surprises, for it has led to most astonishing results. Mr. Philip E. B. Jourdain treats this subject in two articles in the present number of *The Monist*, in one very short essay entitled "Some Modern Advances in Logic" and a longer one entitled "The Philosophy of Mr. Bertrand Russell." The latter is written in a humorous way which adds a peculiar zest to the dryness that otherwise prevails in logic. Even the title and subtitle with the corresponding citations in the appendices are a parody on Mr. Russell's *Critical Exposition of the Philosophy of Leibnitz with an Appendix of Leading Passages*. Mr. Bertrand Russell whom Mr. Jourdain selects as a target for his shafts is one of the most prominent representatives of modern logic.

It is here presupposed that the reader is acquainted with the political views of Mr. Bertrand Russell, who is an enemy of the Philistines' idea of personal property. At the same time he is a staunch free trader, a vigorous upholder of woman suffrage, and in his most popular writings, he prefers to speak in paradoxes.

Modern mathematicians have become conscious of the limitations of Euclid and give expression to the hypothetical nature of the traditional method of stating propositions by rendering them conditional through an "if." They do not say: "A is true, therefore B is true," but "If A is true, then B is true." With all due respect for this subtlety, we can not help thinking that this cautious mode of expression is like walking on stilts while one may step squarely on firm ground.

Mr. Bertrand Russell corrects the traditional idea that mathematics deals with space. According to his view mathematics is pure logic. And this notion has become quite common among modern mathematicians. For instance: "In geometry for example we do not, as formerly everybody used to think, study the properties of the space we live in: We only say things of the form—'if space has such and such properties, then it has such and such other properties.'" This method appears very guarded, but it is simply awkward and misleading. It is, as we said before, stilted and not in agreement with the true nature of mathematics. The mathematical feature is ignored and the logical connection of its propositions is considered as the whole and the only thing of value. If in the same way we annul the facts of the several sciences, and limit our attention to their methods we might declare that astronomy is mere mathematics and financeering pure arithmetic.

Our own view is somewhat more direct than the stilted thought of "if" clauses, and we trust it will prove more helpful, more true, and more clear. Instead of saying "if space is so and so," we prefer to construct space and see what the result will be.

We bear in mind that we gain the conditions of our construction by abstraction; which means, we think away all matter and energy, all concrete existence, all particular things, and retain only pure form, which is the relational among things characterized as non-concreteness, non-particularity, and we note that non-particularity implies anyness. We drop from thought our own concrete existence and retain only possibility of motion *in abstracto*. We move in mere extension, which we have described as the scope of motion. Instead of saying "If we move about," we move about in thought and note the result of our doings in this field of anyness. Thus we start from the facts of experience: we create a field for our activity by abstraction and construct in it the several purely formal sciences. The foundation is given by the facts of existence, but we must clear the field by removing what otherwise is the most important part of knowledge, the data furnished by the senses. The method is (in Kantian terminology) *a priori* and the constructions accomplished are purely mental.

It is obvious that mathematical space is not the space we live in, but an abstract idea, constructed from the notion of pure form which has been gained by an analysis of experience.

There is no need of repeating how mathematical space and

then its several tools, the plane, the straight line, and the right angle, are produced as unique limits by halving the scope of motion (mathematical space) and how they become so valuable on account of their uniqueness which makes it possible that they can serve as standards of reference.\* No need to insist here that there is no objection to making other constructions of non-Euclidean spaces. The question is not which space is true, or corresponds to our physical space, but which system of construction is most serviceable in practical life.

We find that mathematics rests on a good foundation and would encourage mathematicians to dare trust their science. Feeling the *terra firma* of fact under our feet we confidently discard the stilts of a gingerly "if." We do not say, "If I abstract the notion of pure space and of pure motion, if I halve the scope of pure motion so as to make both halves equal, if I do this or that," but we simply do it and watch the result of our doings. At the same time we see no need in denying that there is an element in geometry, the product of our moving about, which we call mathematical space, and which can not be deduced from pure logic. Mathematics, or rather geometry, is not merely pure logic. It contains an additional factor which is the specifically mathematical feature of mathematics. The logical element in mathematics, and also the relation of the *if*-sentence to its conclusion, are merely the means to an end, while the essential result consists in tracing the several properties of space, viz., the nature of angles, of triangles, of circles, of curves of all degrees and kinds, all of which are constructions in the field of anyness and results of our own doing, and they contain features which would remain unintelligible if we could not trace them in figures within the scope of our thought-motion. These results, and not the indispensable tools of logical method, are after all the main objects of the mathematician's inquiry.

The new logic and the new mathematics herald a new period in the development of scientific thought. They find their counterparts in physics in the denial of absolute motion, and we do not deny that all these efforts tend in the right direction. We gladly recognize the valuable work accomplished by Peano and Bertrand Russell, not to mention others, such as Frege, Georg Cantor and men of former generations; but we believe that the results of their labors can easily be supplied with or supplemented by a sound philo-

\* See the writer's *Foundation of Mathematics*, pp. 69-72, and the condensed synopsis of his work *The Philosophy of Form*, p. 9.

sophical foundation, and thereby we can dispense with all ifs as paradoxes and mystifications.

P. C.

#### DR. EPSTEIN ON THE TABERNACLE.

Much has been written and published about the construction of the Tabernacle and the Temple, but modern investigators have naturally acquired a habit of studying all the theories that have been propounded by their predecessors, whereupon they select from these traditional interpretations what they deem most probable. Dr. Epstein, however, forms an exception to this rule. He belongs to an old generation. He is by birth an Israelite and has grown up in the old-fashioned way of Jewish tradition. He reads and speaks Hebrew fluently, and is as familiar with the Biblical text as devout modern Christians frequently are with the King James version. His interpretation is based upon the original Hebrew, and he has compared his views with other explanations only after having formed his own opinion.

The problem of the nature of the Tabernacle is independent of the question whether or not the Tabernacle existed. It may have been a pure invention as is now commonly believed by critics. The problem of the exegetist is above all an expression of the meaning of the text and what the author of these passages meant to describe, and here Dr. Epstein is the best man to give us a correct answer. Even among rabbis the knowledge of Hebrew as a living tongue has become rare, and here we have an unbiased rendering of the text as it impresses itself upon a man who has grown up in the language of holy writ. A test of the value of Dr. Epstein's conception seems to be that the construction of the Tabernacle appears not only feasible but practical. The interpretation of the two planks as resting against each other, renders it possible that the building could have been easily erected and would withstand even a storm in the desert. Further, these planks would not be so heavy as to make their transportation impossible to a tribe of migratory nomads, while it would be a problem to determine how big beams could be transported and be taken up and taken down again as readily as a nomad pitches his tent. This tabernacle of Dr. Epstein could be easily transported on four ox-carts, and its erection would not demand either unusual skill or exertion. At any rate we deem